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# An Epidemiologic Study of the Human Bite

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HUMAN BITES ARE A SERIOUS MEDICAL and surgical problem. A wide range of secondary consequences have been documented in the medical literature, including deformity, amputation, infection, transmission of disease agents, and psychosexual aberrations. Recognition of the human bite as part of the battered child syndrome is also emerging. Each report in the literature, however, usually deals with only a specific problem and is based on a single observation or only a small series of cases. As far as we know, no epidemiologic study based on a large series of human bites has been previously reported.

We present the results of analysis of a large series of human bites by the time and place of occurrence and the victim. We also consider the implications of the human bite as a public health issue of some significance.

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## Materials and Methods

Animal bite is a reportable condition under sections 11.02–11.07 of the New York City health code. In the fall of 1976, a new report form for animal bites was implemented by the New York City Department of Health. This form included checkboxes for the animals most commonly biting people (dogs, cats, and rats); in addition, checkboxes for “other” and “human” were added to the report form. The addition of “human” enabled us to collect and line-list all the reports of human bites in 1977 in New York City—892. The following information about these bites was placed on punchcards and analyzed: day of the week and month of the year; age, sex, and address of the person bitten; part of the body bitten; type of activity in which the victim was engaged; place of occurrence of bite; reporting facility; and period between the biting incident and receipt of the report by the city health department. The population of New York City, the 5 boroughs, and the 30 health districts in these boroughs is based on U.S. Census data for 1970.

## Results

**Time.** Figure 1 depicts the number of human bites

by month and day of the week. The fewest bites were reported in the winter months of January and February. The number of bite reports sharply increased through the spring and early summer and then gradually fell in the fall and early winter. The 6-month period March through August accounted for 60 percent of the total

Figure 1. Human bite reports, by month and day of the week, New York City, 1977

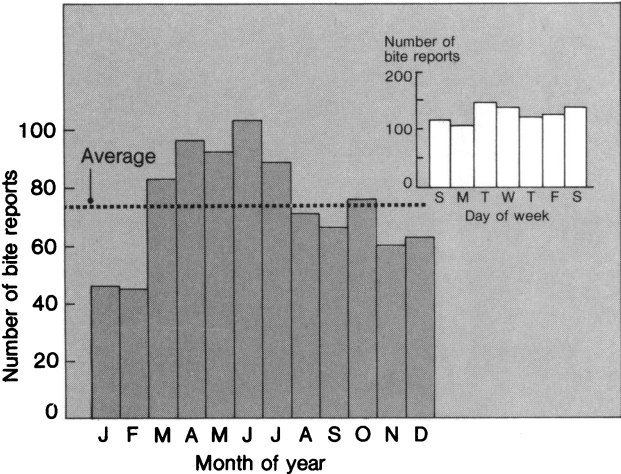
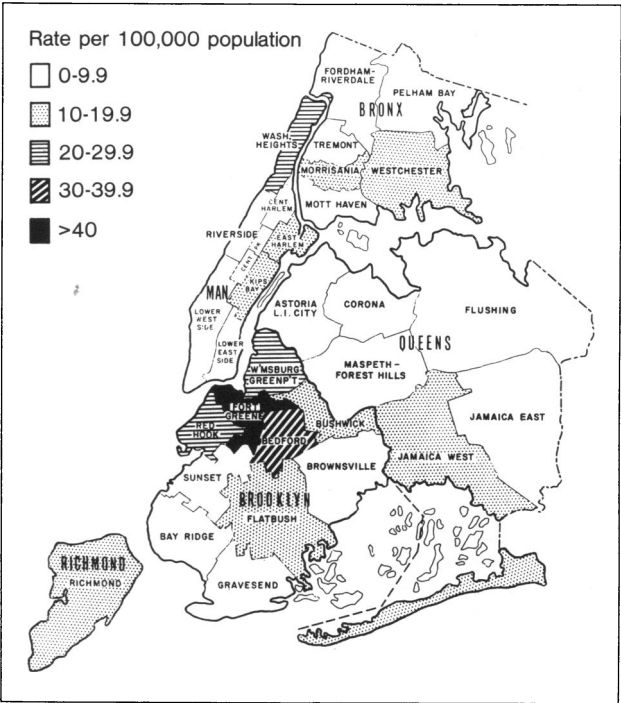


Figure 2. Human bite rates per 100,000 population, by borough and health district, New York City, 1977



yearly bite reports. The daily bite average for 1977 was 2.4; the weekly average was 17.1; the bite reports were relatively evenly distributed among the days of the week (fig. 1).

**Place.** Table 1 and figure 2 represent the yearly number of human bites, the human bite rates per 100,000 population, and the rank order of the 30 health districts in the 5 boroughs in human bite rates. The 892 bites reported by city hospitals and physicians represented 10.7 bites per 100,000 population per year. Of the boroughs, Richmond reported the fewest bites but accounted for the highest bite rate; Brooklyn had the

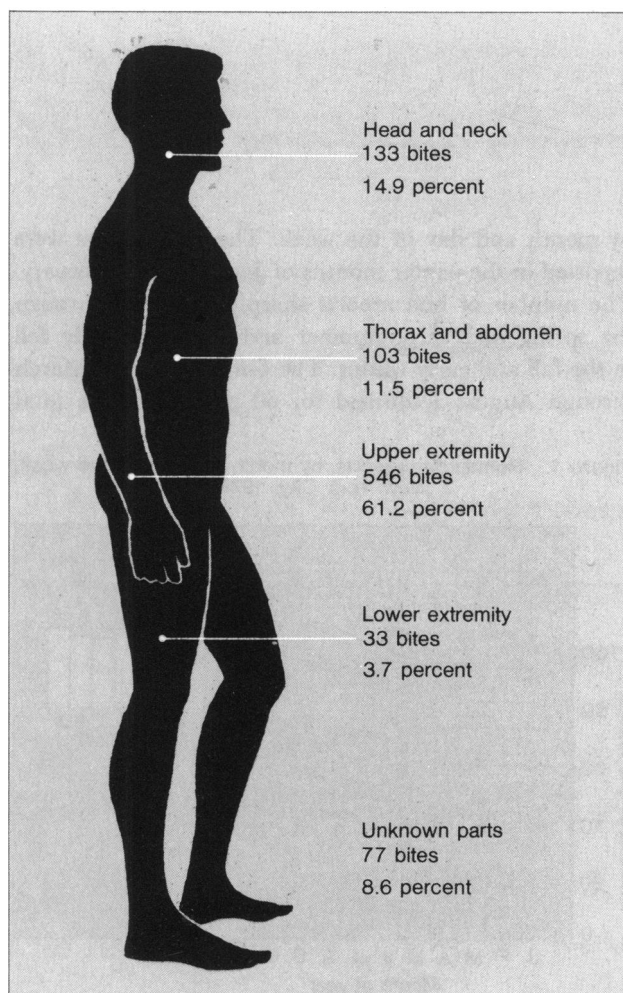
Table 1. Human bites, New York City, 1977 by borough and health district

Borough and health district	Number of reports	Rate per 100,000 population	Health district rank
New York City .....	892	11.8	..
Manhattan .....	156	10.1	..
Central Harlem .....	15	8.2	15
East Harlem .....	18	11.5	11
Kips Bay/Yorkville .....	29	13.1	10
Lower East Side .....	11	4.4	19
Lower West Side .....	20	7.9	16
Riverside .....	5	2.3	26
Washington Heights .....	58	23.4	4
Brooklyn .....	420	16.1	..
Williamsburg/Greenpoint ..	51	29.0	3
Bay Ridge .....	4	1.5	27
Bedford .....	91	32.9	2
Brownsville .....	9	2.8	23
Bushwick .....	25	10.9	13
Flatbush .....	73	14.9	8
Fort Greene .....	115	60.9	1
Gravesend .....	8	2.5	24
Red Hook/Gowanus .....	30	21.3	5
Sunset Park .....	14	7.6	17
Bronx .....	99	6.7	..
Fordham/Riverdale .....	9	3.7	21
Morrisania .....	43	16.4	7
Mott Haven .....	7	3.3	22
Pelham Bay .....	2	1.0	29
Tremont .....	6	2.3	25
Westchester .....	32	11.1	12
Queens .....	116	5.8	..
Astoria/Long Island City ..	12	4.8	18
Corona .....	24	9.4	14
Flushing .....	21	4.3	20
East Jamaica .....	3	0.9	30
West Jamaica .....	53	14.7	9
Maspeth/Forest Hills .....	3	1.2	28
Richmond .....	51	17.3	6
Other .....	50	...	..

greatest number of bites and the next highest bite rate. By rank, the 3 top health districts in terms of bite rates were all in Brooklyn, which also contributed 5 of the 10 highest bite rates in the 30 health districts. The hospitals and physicians of the Fort Greene health district reported 115 human bites, for an annual rate of 60.9 per 100,000 population, nearly 6 times the overall city rate. The high bite rates for the health districts adjacent to Fort Greene suggest that human bite cases were clustered in the northeastern section of Brooklyn.

Table 2 shows the place of occurrence of human bites treated in New York City in 1977, as reported to the health department. In a large proportion of the reports with a place mentioned (39.1 percent), the specific location of the incident was not listed. Indoor sites (the home, schools, hospitals, bars, and so forth) accounted for 62.6 percent of the bites for which a location was given and 38.7 percent of the total bites. In six instances, bites took place in vehicles; in six others that

Figure 3. Human bite reports, by part of the body bitten, New York City, 1977



reportedly occurred indoors, the location was not specified. In the remaining 191 instances with a location reported (21.4 percent), the bites occurred outdoors—in streets, playgrounds, sports fields, and so forth.

**Part of body bitten.** Figure 3 depicts the general area of the body bitten, and table 3 shows the specific location. The upper extremities accounted for the largest percentage of human bites (61.2 percent), followed by the face and neck and then the trunk and lower ex-

trémities. Among specified bites of the upper extremities, bites of the hand (including the thumb and fingers) accounted for 55.4 percent; the shoulder, arm, forearm, and wrist accounted for the remainder. Most of the

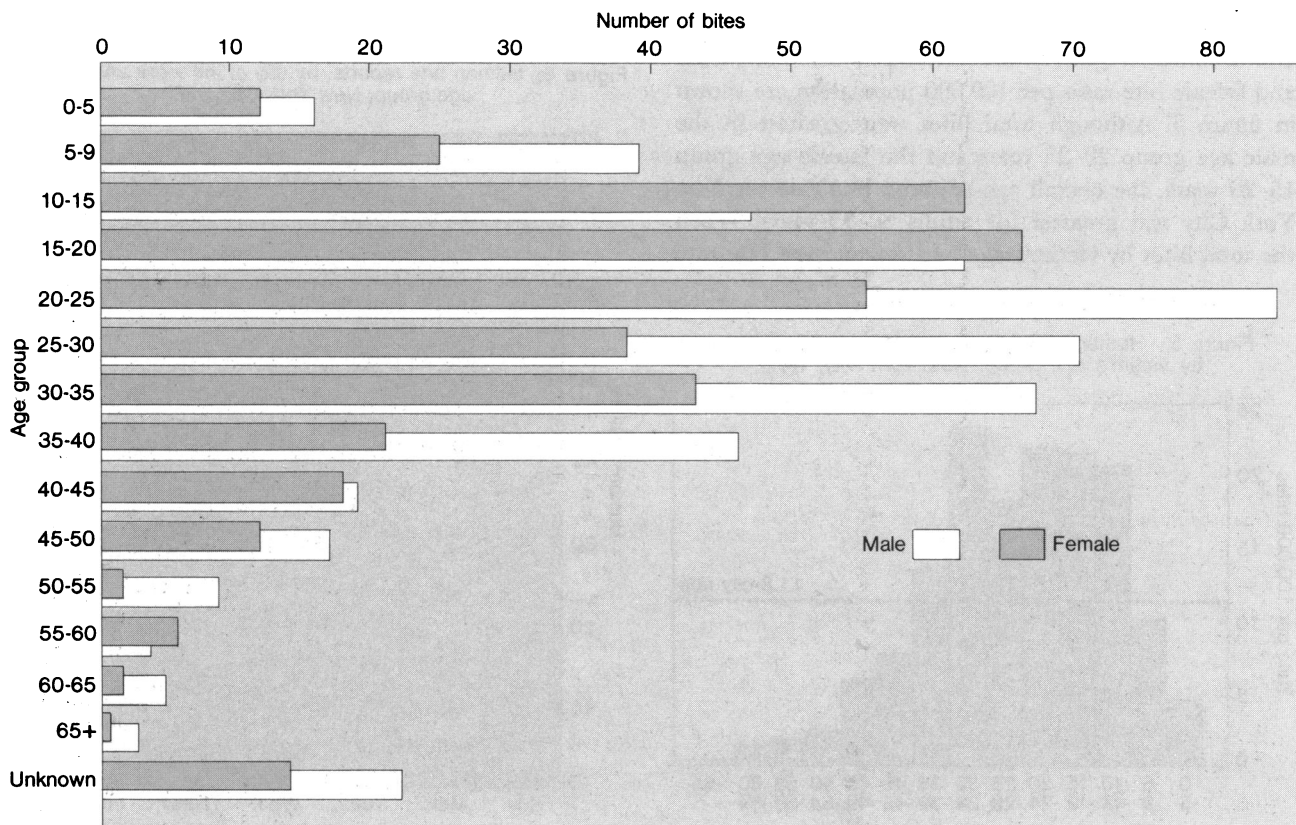
Table 2. Place of occurrence of human bites treated in New York City, 1977

Place	Number of reports	Percent of total (N = 892)	Percent of total with known locations (N = 543)
Indoors .....	340	38.1	62.6
Outdoors .....	191	21.4	35.2
Vehicle .....	6	0.7	1.1
Other specified .....	6	0.7	1.1
Unstated .....	349	39.1	...

Table 3. Human bites, New York City, 1977, by part of the body bitten

Part of body	Number of reports	Part of body	Number of reports
Head and neck .....	133	Upper extremities .....	546
Scalp .....	3	Shoulders .....	19
Eyebrows .....	7	Arms .....	15
Face, unspecified ..	49	Forearms .....	39
Ears .....	21	Wrist .....	13
Nose .....	2	Hand, unspecified ..	151
Cheeks .....	16	Fingers .....	118
Lips .....	12	Thumb .....	62
Chin .....	5	Unspecified .....	129
Neck .....	11	Lower extremities .....	33
Unspecified .....	7	Thigh .....	12
Trunk .....	103	Calf .....	8
Chest .....	33	Foot .....	2
Breasts .....	27	Unspecified .....	11
Back .....	30	Unknown .....	77
Abdomen .....	11		
Genitals .....	2		

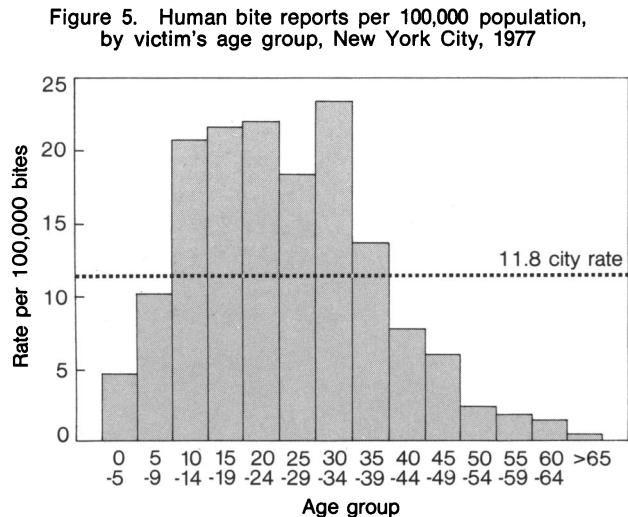
Figure 4. Human bite reports, by victim's age group and sex, New York City, 1977



bites assigned specifically to the head and neck were facial, involving particularly the ears, cheeks, and lips, which collectively accounted for 78 percent of the specifically designated facial bites. Bites on the trunk were relatively equally distributed among the chest, breasts, and back. The abdomen accounted for only 11 bites; in 2 instances, the penis was bitten. The lower extremities accounted for 33 bites, with the thigh contributing 60 percent. In 77 instances, a bite site was not recorded.

In 305 instances, left versus right in terms of body polarity was either not stated, or else the location of the bite was central. Of the 587 bites for which polarity was recorded, 318 (54.5 percent) were left-sided and 267 (45.5 percent) right-sided. Bites on the left side of the body exceeded right-sided bites in all major regions of the body, although for specific body parts, for example, the hand (including the fingers and thumb), right-sided bites predominated.

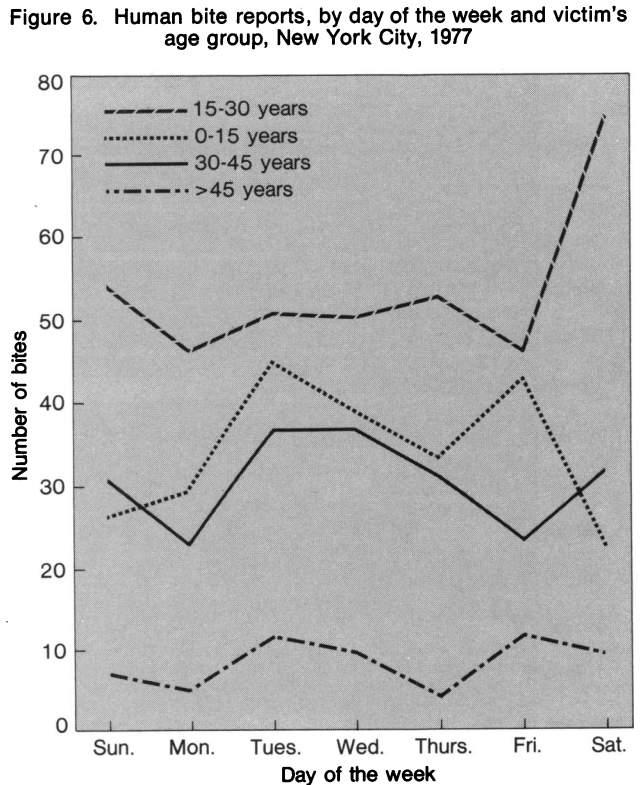
**Age and sex characteristics of victims.** The age and sex characteristics of the bite victims are shown in figure 4. Males were more commonly bitten than females in all age groups except those 10–20 and 55–60 years. Total bites among males increased from the preschool age up to a peak at ages 20–25 years and then gradually declined in the older age groups. The peak in female bites occurred earlier—at ages 15–20 years—and declined irregularly thereafter. The combined male and female bite rates per 100,000 population are shown in figure 5. Although total bites were greatest in the male age group 20–25 years and the female age group 15–20 years, the overall age-adjusted bite rate for New York City was greatest for adults 30–35 years. When the total bites by victim's age and sex and the bite rate



per 100,000 population were examined by borough and individual health district, a similar pattern was found.

**Day of the week.** Although, as already mentioned, the number of bites recorded by day of the week varied little, there was a definite peak in biting frequency on Saturdays for the 15–30 year old age group (fig. 6). Also, although the male to female ratio for bites was overall 1.35 to 1 and was 1.32 to 1 for the 6-day period Sunday through Friday, for Saturdays it was 1.60 to 1.

**Activities associated with bites.** In 463 instances (41.9 percent), the activity associated with the biting incident was reported. We divided these activities into aggressive and nonaggressive (accidental) categories in terms of causes of the bites (table 4). Overtly aggressive acts accounted for 72.8 percent of the bites in which the activities involved were known. Of the bites resulting from overtly aggressive acts, fighting accounted for 60 percent, police arrests for 8.5 percent, and mugging or being mugged for 4.3 percent. Presumed accidental causes accounted for approximately one-fourth of the known activities involving bites. Most of the activities involved in the presumed accidental bites were related to various sports or games, including basketball, football, and rough-housing (12.1 percent), and other school-related activities (4.5 percent). In



15 instances (3.2 percent), the presumed accidental bites were hospital-related; for example, some occurred while the victims were trying to restrain children or seizure patients. In the remaining 33 instances (7.1 percent), the activities listed seemed to be attempts to explain the circumstances surrounding the biting incident. However, the listed activities (singing, shopping, playing pool, talking to one's wife, self-inflicted bites, and so forth) often raised more questions than they answered.

**Reporting bites of human beings.** Historically, most health departments have required the reporting of animal bites as part of their surveillance for rabies. In

Table 4. Type of activity associated with human bites, New York City, 1977

Activity	Number <sup>1</sup>	Percent <sup>1</sup>
Aggressive .....	337	72.6
Fighting .....	278	59.9
Police arrest .....	39	8.4
Mugging .....	20	4.3
Nonaggressive .....	127	27.4
Playing .....	56	12.1
School activity .....	21	4.5
Medical treatment .....	15	3.2
Sexual .....	2	0.4
Miscellaneous .....	33	7.1
Total .....	464	100.0

<sup>1</sup> Reports of human bites in which associated activity was known.

Table 5. Bites reported to the New York City Department of Health, 1977, ranked by number and percentage caused by various animal groups

Rank	Animal group	Number of reports	Total
1 .....	Dog .....	22,076	89.1
2 .....	Cat .....	1,152	4.6
3 .....	Human .....	892	3.6
4 .....	Rodent <sup>1</sup> .....	548	2.2
5 .....	Lagomorph <sup>2</sup> .....	40	0.2
6 .....	Small mammal <sup>3</sup> .....	32	0.1
7 .....	Equine <sup>4</sup> .....	18	0.1
8 .....	Reptile <sup>5</sup> .....	17	0.1
9 .....	Avian <sup>6</sup> .....	8	0.03
10 .....	Large mammal <sup>7</sup> .....	7	0.03

<sup>1</sup> 229 wild rats, 156 miscellaneous, 114 squirrels, and 49 laboratory rodents.

<sup>2</sup> All pet rabbits.

<sup>3</sup> 21 monkeys, 4 raccoons, 3 ferrets, 1 weasel, 1 coati mundi, 1 skunk, and 1 goat.

<sup>4</sup> 15 horses, 2 donkeys, and 1 pony.

<sup>5</sup> 11 snakes, 5 turtles, and 1 lizard.

<sup>6</sup> 4 parrots, 2 geese, 1 rooster, and 1 bluejay.

<sup>7</sup> 3 lions, 1 ocelot, 1 leopard, 1 polar bear, and 1 anteater.

certain areas of the United States (such as New York City), rabies has now ceased to be a problem among terrestrial mammals, the only potential indigenous source of this disease being the bat (1). Yet, despite the declaration of the New York City area as rabies free, animal bites have continued to be reported in large numbers each year, as noted in table 5. Table 5 shows the contribution of bites by *Homo sapiens* to the total animal bites reported to the New York City Department of Health in 1977. By species, bites due to *H. sapiens* rank third after those due to dogs and cats. Rodent bites, a major concern in recent years (which have generated Federal programs for rodent control) rank fourth. When wild rat bites are separated from other rodent bites, the ranking remains the same, but wild rat bites are only one-fourth the magnitude of human bites.

## Discussion

Upon institution in 1976 of the revised animal bite report form, the reporting of animal bites was separated from the traditional infectious disease reporting system of the New York City Department of Health (2). This revised form was designed to gain further information on the activities surrounding biting incidents. The addition of special boxes to identify the specific biting animal, including one labeled "human," resulted in a large number of human bites being reported in 1977. Because this result was unexpected, additional information that would have been helpful in studying the phenomenon of the human bite was not collected. Nevertheless, some interesting observations and conclusions can be made based on the existing data.

Human bites appear to have a definite seasonality. Figure 1 demonstrates that the human bites reported in New York City in 1977 occurred much more frequently in certain months of the year. It is unlikely that the sustained excess of human bite reports from March through July was due to a selective reporting bias. In our experience, the reporting of health professionals is relatively constant throughout the year, and the observed seasonality in reports of infectious diseases (namely, measles and salmonella) and of noninfectious conditions (namely, lead and carbon monoxide poisonings) represents true trends and not preferential reporting. If any decrease at all were to occur in the reporting of diseases, it might be expected in the summer months when many health professionals take their vacations.

The explanations that have been advanced for the summer peak in dog bite reports can only in part explain the peak in reports of human bites. The authors of previous reports have suggested that the excess dog

bites during summer may be due to (a) less clothing on the victim, (b) more free-ranging dogs, and (c) more contacts between these dogs and their primary victims—children (3,4). Although less clothing may account for the paucity of human bite reports during cool and cold weather, it cannot explain the dip in reported bites in August and September. Also, it is unlikely that there are more free-ranging human beings who bite in the spring and early summer months than at other times of the year!

Perhaps a partial explanation for the observed seasonality in human bites can be found in table 4, in which the types of activity associated with the occurrence of human bites are categorized. Nearly 73 percent of the human bites reported in New York City in 1977 were consequent to aggressive behavior. Of the general regions of the body bitten, the upper extremities accounted for a disproportionately large number of bites (fig. 3), and of the specific regions of the body bitten, so did the hands and fingers (table 3). These results support the testimony of surgeons and emergency room physicians who have noted from personal experience that human bites are often the result of fist fights in which the knuckles and fingers are damaged (5). Other bites resulting from accidents tend to be more randomly distributed over the body surface, although bites incurred in treating seizure victims, as well as sexually associated bites, have specific target organs.

In further support of the belief that fighting is an important factor in explaining seasonal variation, a greater number of bites occurred among males than females (fig. 3), and the frequency of bites was greater among teenagers and young adults (fig. 5). The number of female bite victims was greater than male between the ages of 10 and 20 years, but thereafter male victims exceeded female victims. Overall, bites were most often inflicted on persons between 10 and 20 years of age, an age group that includes teenagers and young adults (who may be more likely to use overt, aggressive action to solve differences with their peers). And although there is no clear pattern in overall reported bite incidents by day of the week (fig. 1), when the bites of age groups are plotted by day of the week (fig. 6) among both sexes 15–30 years old, they increase substantially on Saturdays. Conversely, bites among day-care, preschool, and school-age children decrease on Saturdays, as might be expected. Bites of adults 30 years and older show little variation.

If human biting is not strongly linked to a time factor or a time-associated factor (for example, temperature and humidity), perhaps some factor of place might help to explain our results. However, as seen in table 2, no location was specified for nearly two-fifths of the

reported human bite cases. Also, for the remaining cases for which a location was specified, the information was not sufficient to subgroup the places as indoor or outdoor. Although it is not shown in the results presented here, the ratio of indoor to outdoor locations did not change over the months. To show a transition from barroom to alley to street to park from March through July would have been gratifying, but information to document such a transition was not available. One might speculate that the supply of susceptible victims was exhausted by August—epidemiologically, emotionally, and physically, but that would be only speculation. Thus, at present, we are left with no adequate explanation of the monthly trend for human bites in New York City. Such data will probably need to be observed secularly over a longer period, and more detailed information will have to be obtained on the biting occurrence before we can state that there is a seasonality in human bites.

A puzzling observation in our study was the apparent clustering of human bites and high human bite rates in the northeastern section of Brooklyn. Figure 2 and table 1 show that there was a focus of human bite activity in four contiguous health districts in Brooklyn. With one exception (Manhattan's Washington Heights health district), these 4 districts accounted for the highest rates of human bites among the 30 city health districts. Preferential reporting cannot explain this focus, since other reportable conditions (pediatric immunizable diseases, hepatitis, central nervous system infections, and dog bites) do not show this pattern. Moreover, the distribution of the hospitals and physicians in New York City who are responsible for these reports would favor the underestimation of all reportable conditions from these areas of the city. Therefore we believe that the data represent a real excess of bites from this area of Brooklyn, but as also for the suggested seasonal pattern of occurrence, we can only hazard an explanation. The human bite rate for Fort Greene (60.9 per 100,000) is more than 5 times the rate for the city as a whole and nearly 4 times the rate for Brooklyn. Median family income, population density, and the percentage of the population under 18 years of age did not correlate with the observed bite frequencies. The residents of this area (downtown Brooklyn) have suggested that the change and interchange among different community groups in the area may predispose to greater violence. However, we do not have sufficient demographic data or police reports to test this hypothesis. Thus, we can only present our data and hope that others may use them in future studies of human bites and their possible relationship to aggression.



In the 6 years 1972–77, there were 73 references in the medical English literature relating to human bites (Medlar II, National Library of Medicine's National Interactive Retrieval Service, years 1972–August 9, 1978). These references fall into five groups: forensic dentistry and pathology (30 articles); medical management, especially infectious disease problems (19 articles), and psychiatry (4 of the 5 references concerned the battered child syndrome). Although many medical and surgical articles include a review of the literature, these reviews either are based on a small number of cases or deal with a specific condition and thus cannot be considered epidemiologic reports. Similarly, although in standard textbooks of pathology, internal medicine, pediatrics, surgery, and psychiatry, the serious complications of the human bite are acknowledged, the problem is not discussed holistically.

Even more surprising, major literary concordances reveal few citations in which people literally bite other people, although animal bites and figurative references to biting abound. Writers who have referred to human bites include Geoffrey Chaucer, Stephen Crane, Ralph Waldo Emerson, Robert Frost, Eugene O'Neill, Alexander Pope, Theodore Roethke, William Shakespeare, George Bernard Shaw, and Edmund Spenser. The Old Testament also contains such references.

Discussions with anthropologists and a review of the anthropological literature also showed a paucity of information on biting among human beings versus non-human primates. Also, unfortunately, the universally recognized phenomenon of the human bite finds a disproportionately small place in the arts and sciences. Nor is the place of the human bite any more evident in the epidemiologic literature.

Our study, which can be considered only a beginning, suffered from a lack of important information. For

example, we were unable to identify the hour of the day when the bite occurred, the exact place, the specific activity involved, the severity of the bite, the consequent medical and surgical procedures and the cost of treatment, and more important—the biter as well as the victim. Such data would have allowed a more extensive analysis and discussion of the problem. However, with the existing data we hope to call attention to a heretofore isolated health problem that falls in the middle of the continuum that has been collectively called “the bite problem.”

The collection of statistics on animal bites continues to serve a useful purpose, namely, the monitoring of a major unrecognized epidemic—dog bites. The reports aid in the identification of the multiple offender and provide a record of mutilations and deaths due to animal attacks. Thus, they continue to be used as a surveillance mechanism for violent and uncontrolled urban animal behavior. Perhaps a systematic examination of the reports of human bites could serve similarly as a surveillance mechanism for aggressive and pathological human behavior.

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## SYNOPSIS

MARR, JOHN S. (New York City Department of Health), BECK, ALAN M., and LUGO, JOSEPH A., JR.: *An epidemiologic study of the human bite. Public Health Reports, Vol. 94, November–December 1979, pp. 514–521.*

The 892 human bites reported to the New York City Department of Health in 1977 were analyzed by time, place, and the victim's characteristics. The bites appeared to have a seasonality, increasing in

March and exceeding the mean monthly average through August. The bite rate for the entire city, 10.7 per 100,000 population, was exceeded in 5 of the 10 Brooklyn health districts; one of these districts reported a rate of 60.9 human bites per 100,000 population. Most of the bites with identifiable locations occurred indoors (63.2 percent). In 72.8 percent of the bite episodes in which the activities surrounding them were known, these

activities were aggressive in nature. Males exceeded females as bite victims in all age groups except those 10–20 and 55–60 years.

Bites of the upper extremity accounted for 61.2 percent of the total bites. Left-sided bites exceeded right-sided, except for the hand. In frequency of reported occurrence, the human bite ranks third, after the dog bite and the cat bite. Human bites may be a useful indicator of antisocial behavior.